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| 10/553,223      | 05/01/2006  | YuanKai Zheng        | ALLNP0105US         | 8980             |

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| EXAMINER |
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AUDUONG, GENE NGHIA

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2827

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                     |  |
|------------------------------|--------------------------------------|-------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/553,223 | <b>Applicant(s)</b><br>ZHENG ET AL. |  |
|                              | <b>Examiner</b><br>Gene N. Auduong   | <b>Art Unit</b><br>2827             |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10-13-2005</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on October 13, 2005 is being considered by the examiner.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhu (US Pat. No. 5,930,164) in view of Zhu et al. (US Pat. 6,765,823).

Regarding claim 1, Zhu ('164) discloses a magnetic memory unit as in figure 1, comprising: a first hard magnetic layer 111 having a first fixed magnetization vector, a second hard magnetic layer 121 having a second fixed magnetization vector, a first soft magnetic layer 112 having a first alterable magnetization vector and disposed adjacent to the first hard magnetic layer 111, and a second soft magnetic layer 122 having a second alterable magnetization vector and disposed adjacent to the second hard magnetic layer 121; wherein the first and the second soft magnetic layers are magnetostatically coupled antiparallel to each other (col. 2, lines 32+). Zhu does not explicitly disclose first and second soft magnetic layers are magnetostatically coupled antiparallel to each other to form a flux-closed structure.

Zhu et al. ('823) discloses a magnetic memory array with the teaching the two magnetic layers orient with anti-parallel magnetization orientation to create a closed magnetic flux loop. Thus, the magnitude of the magnetic fields generated by each line are high enough so that the combination of both fields switches the logic state of the selected magneto-resistive memory cell but low enough so that the other magneto-resistive memory cells subject to only one magnetic field do not switch and allowing other conductor to be used exclusively. In this way, writing and reading operations may be performed simultaneously, increasing the speed of data access (col. 2, lines 29+; col. 4, lines 29-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention made to modify Zhu ('164) to include the teaching by Zhu et al. ('823) the two magnetic layers orient with anti-parallel magnetization orientation to create a closed magnetic flux loop. Thus, the magnitude of the magnetic fields generated by each line are high enough so that the combination of both fields switches the logic state of the selected magneto-resistive memory cell but low enough so that the other magneto-resistive memory cells subject to only one magnetic field do not switch and allowing other conductor to be used exclusively. In this way, writing and reading operations may be performed simultaneously, increasing the speed of data access.

Regarding claims 2-3, Zhu (164) in view of Zhu et al. (823) disclose the memory cell as recited in claim 1, wherein the first and the second soft magnetic layers are disposed between the first and the second hard magnetic layers (see figure 1).

Regarding claim 4, Zhu (164) in view of Zhu et al (823) disclose the memory cell as recited in claim 1, further comprising an anti-ferromagnetic layer disposed adjacent to one of the

first and the second hard magnetic layers to fix the orientation of the magnetization vector therein (figure 1).

Regarding claim 5, Zhu (164) in view of Zhu et al (823) disclose the memory cell as recited in claim 4, further comprising an assistant magnetic layer 13 disposed adjacent to one of the first and the second hard magnetic layers, wherein the assistant magnetic layer having a magnetization vector anti-parallelly aligned with one of the first and the second hard magnetic layers to reduce the static magnetic field thereof (col. 2, lines 41+).

Regarding claim 6, Zhu (164) in view of Zhu et al (823) discloses the memory cell as recited in claim 1, further comprising an electrically conductive layer disposed between the first and the second soft magnetic layers for passing an electric current therethrough (figure 3).

Regarding claim 7, Zhu (164) in view of Zhu et al (823) discloses the memory cell as recited in claim 6, wherein the memory cell is adapted to allow passing of an electric current in a first direction and at least one of the magnetization vectors of the first and the second hard magnet layers is orientated along a second direction oblique to the first direction (col. 3, lines 3+).

Regarding claim 8, Zhu (164) in view of Zhu et al (823) discloses a magnetic memory device comprising a plurality of memory cells as claimed in claim 1 (figure 3).

Regarding claim 9, Zhu (164) in view of Zhu et al (823) disclose the magnetic memory device as recited in claim 8, further comprising an electrically conductive line coupled to the plurality of memory cells (figure 3).

Regarding claim 10, Zhu (164) in view of Zhu et al (823) disclose the magnetic memory device as recited in claim 9, further comprising a plurality of gate members each coupled to the

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plurality of memory cells through the electrically conductive line for controllably supplying an electric current to the respective memory cell through the electrically conductive line (figure 3).

Regarding claim 11, Zhu (164) in view of Zhu et al (823) disclose the magnetic memory device as recited in claim 9, wherein the electrically conductive line is provided for performing both a writing operation and a reading operation (word lines and bit lines are for read and write data to the memory cells).

Claims 12-18 contains the similar limitation as previously discussed in claims 1-11. Therefore, they are analyzed as previously discussed with respect to claims 1-11.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gene N. Auduong whose telephone number is (571) 272-1773. The examiner can normally be reached on Monday - Friday from 8:00-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GA  
February 7, 2008

/Gene N. Auduong/  
Gene N Auduong  
Primary Examiner  
Art Unit 2827